

**TRANSMITTAL****PATENT**

Application No. 09/634,045
Filing Date: August 8, 2000
First Named Inventor: Drew Eric Wingard et al.
Examiner's Name: Thompson, Annette M.
Art Unit: 2825
Attorney Docket No.: 002998.P011

- ☐ An Amendment After Final Action (37 CFR 1.116) is attached and applicant(s) request expedited action.
- ☒ Charge any fee not covered by any check submitted to Deposit Account No. 02-2666.
- ☒ Applicant(s) hereby request and authorize the U.S. Patent and Trademark Office to (1) treat any concurrent or future reply that requires a petition for extension of time as incorporating a petition for extension of time for the appropriate length of time and (2) charge all required fees, including extension of time fees and fees under 37 CFR 1.16 and 1.17, for any concurrent or future reply to Deposit Account No. 02-2666.
- ☐ Applicant(s) claim small entity status (37 CFR 1.27).

ATTACHMENTS

- ☐ Preliminary Amendment
- ☐ Amendment/Response with respect to Office Action
- ☐ Amendment/Response After Final Action (37 CFR 1.116) (reminder: consider filing a Notice of Appeal)
- ☒ Appeal Brief
- ☐ RCE (Request for Continued Examination)
- ☐ Supplemental Declaration
- ☐ Terminal Disclaimer (reminder: if executed by an attorney, the attorney must be properly of record)
- ☐ Information Disclosure Statement (IDS)
- ☐ Copies of IDS citations
- ☐ Petition for Extension of Time
- ☐ Fee Transmittal Document (that includes a fee calculation based on the type and number of claims)
- ☐ Cross-Reference to Related Application(s)
- ☐ Certified Copy of Priority Document
- ☒ Other: Appendices
- ☐ Other: _____
- ☐ Check(s)
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SUBMITTED BY:

BLAKELY SOKOLOFF TAYLOR & ZAFMAN LLP

TYPED OR PRINTED NAME: Jeffrey T. Holman

SIGNATURE: 

REG. NO.: 51,812

DATE: 12/18/06

ADDRESS: 12400 Wilshire Boulevard, Seventh Floor

Los Angeles, California 90025

TELEPHONE NO.: (408) 720-8300

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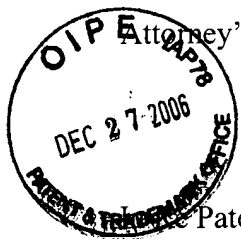
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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Patent Application of:

Drew Eric Wingard et al.

Application No.: 09/634,045

Filed: August 8, 2000

Art unit: 2825

Examiner: Thompson, Annette M.

For: LOGIC SYSTEM WITH
CONFIGURABLE INTERFACE

Confirmation No.: 5608

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APPEAL BRIEF UNDER 37 C.F.R. § 41.37(a)

This is an appeal to the Board of Patent Appeals and Interferences from the decision of the Examiner dated July 17, 2006, which rejected claims 12-22 in the above-identified application. Appellant wishes to reinstate the appeal after prosecution was reopened with the mailing of the non-final Office Action dated July 17, 2006. Appellant's Notice of Appeal was mailed on October 17, 2006. This Appeal Brief is hereby submitted within two months of the filing of the Notice of Appeal. The contents of this Appeal Brief comply with 37 C.F.R. § 41.37(a). Please consider this appeal with all of its merits.

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I. REAL PARTY IN INTEREST

The real party in interest is the assignee of the full interest in the invention, Sonics, Inc., 2440 West El Camino Real, Suite 620, Mountain View, California 94040.

II. RELATED APPEALS AND INTERFERENCES

To the best of Appellant's knowledge, there are no appeals or interferences related to the present appeal that will directly affect, be directly affected by, or have a bearing on the Board's decision in the instant appeal.

III. STATUS OF CLAIMS

Claims 12-22 are pending in the application and were rejected in the Office Action mailed July 17, 2006, after prosecution was reopened by the Examiner. In particular, claims 12-22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,216,259 to Guccione et al. (hereinafter "Guccione"). Additionally, claims 12-22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,510,546 to Blodget (hereinafter "Blodget").

Claims 12-22 are the subject of this appeal. A copy of claims 12-22 as they stand on appeal is set forth in the Claims Appendix.

IV. STATUS OF AMENDMENTS

No amendments have been submitted subsequent to the Office Action mailed July 17, 2006.

V. SUMMARY OF CLAIMED SUBJECT MATTER

This section of this Appeal Brief is set forth to comply with the requirements of 37 C.F.R. § 41.37(c)(1)(v) and is not intended to limit the scope of the claims in any way. Exemplary implementations of the limitations of independent claims 12, 16, and 19 are described below.

Independent claim 12 relates to a new computer core having an interface to communicate with other cores. Figure 2B. The interface contains a plurality of interface signal carriers that are configurable, at compilation, such that at least one of the interface signal carriers is

selectively physically present in the interface or not physically present. Not physically present means that a route connection is not generated for an interface signal carrier selected to be not physically present. Figure 2B and Specification, p. 7, lines 11-25. The configuration of whether a signal is present or not is also referred to as “signal enabling.” Specification, p. 8, lines 23-26. Figure 4 shows one example of a configurable core interface in which signal enabling is used. A “Y” in the Signal Enabling column indicates that the named signal is configurable, and an “N” indicates that the named signal is not configurable. Figure 4.

Independent claim 16 relates to a core on a system on a chip having an interface. Figure 2B. The interface contains a plurality of interface signal carriers that are configurable, at compilation, such that a first interface signal carrier of the plurality of interface signal carriers is configurable to support different levels of functionality for the interface. Figure 2B and Specification, p. 7, lines 11- 25.

Independent claim 19 relates to a method for generating at compilation a core interface for a system on a chip to enable re-use of the core with a different interface configuration. Figure 6. Configurable source code representative of the core interface for the system on a chip and identifying parameters of the core interface is provided. Configuration parameters of the core interface are defined. The core interface for the system on a chip from the configurable source code representative of the core interface and the identified parameters of the core interface configurable in accordance with the defined configuration parameters of the core interface are generated. Specification, p. 9, line 21, to p. 10, line 17.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

- A. Whether the rejections based on Guccione are proper given Appellant’s prior traversal of Guccione.
- B. Whether claims 12-22 are patentable under 35 U.S.C. § 103(a) over Guccione.
- C. Whether the substance of Appellant’s declaration under 37 C.F.R. § 1.131 is adequate to overcome the rejection of claims 12-22 under 35 U.S.C. § 103(a) based on Blodget.

VII. ARGUMENT

For the purposes of this appeal, the claims stand or fall together.

- A. Claims 12-22 are patentable over Guccione because the Examiner already determined that the claims overcome Guccione.

Claims 12-22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Guccione. However, the current Office Action appears to disregard the Examiner's previous determination that claims 12-22 overcome Guccione.

During prosecution of the present application, Appellant submitted new claims 12-22 in a response mailed December 30, 2003. In connection with this amendment, Appellant and the Examiner held a telephone conference on December 30, 2003, during which claims 12-22 were discussed. Among other things, Appellant explained to the Examiner that differences between a field programmable gate array (FPGA) described in Guccione and a system-on-a-chip (SoC), as recited in at least some of the claims of the present application. Following this telephone conference, the Examiner mailed an Interview Summary on January 6, 2004, to summarize the discussions of claims 12-22. In the Interview Summary, the Examiner expressly stated the following:

“Examiner determined that **the proposed claim amendments would overcome the prior art of record** [Guccione] and require a new search.”
Interview Summary, December 30, 2004 (emphasis added).

It should be noted that the Examiner's determination was stated generally, and was not limited to a particular type of rejection. Rather, the Examiner clearly stated that claims 12-22 overcome Guccione, which was the prior art reference on which the rejections were based at that time. The basis for the Examiner's statement was the added limitation that device is configurable such that “at least one of the interface signal carriers is selectively physically present in the interface or not physically present, wherein not physically present means that a route connection is not generated for an interface signal carrier selected to be not physically present.” The Examiner acknowledge that each instance of a particular type of FPGA will have all of the transistors and physical connections as another instance of that particular type of

programmable logic device (PLD). Guccione merely discusses PLDs. The same limitation is still present in the claims at issue now a couple years later. Therefore, the Examiner's statement from the Interview Summary should apply to Guccione regardless of whether Guccione is used as the basis for a rejection under 35 U.S.C. § 102 or § 103. The subject matter disclosed in Guccione has not changed. Accordingly, Appellant respectfully requests that the current rejection of claims 12-22 under 35 U.S.C. 103(a) based on Guccione be withdrawn.

Moreover, Appellant submits that reopening prosecution of the present application based on the "new" rejection using Guccione was improper because the rejection using Guccione was not a new rejection. The M.P.E.P. allows an examiner to "reopen prosecution to enter a new ground of rejection" after an appellant files an appeal brief or reply brief. M.P.E.P. § 1207.04. However, the M.P.E.P. does not authorize an examiner to reopen prosecution based on an old rejection that has previously been overcome. In the present case, the Guccione reference was previously overcome, as explained above. Thus, the Guccione reference was not a new reference. Given that Guccione reference was not a new reference, and the M.P.E.P. merely allows an examiner to reopen prosecution based on a new reference, Appellant respectfully submits that the Examiner's actions in reopening prosecution of the present case was improper.

Furthermore, Appellant notes that the current appeals rules were implemented with the purpose of reducing the pendency of patent applications. See Federal Register, Vol. 69, No. 155, p. 49963, describing 37 C.F.R. § 41.39(a)(2). While these comments are stated specifically in connection with a discussion of the procedure for an examiner's answer, Applicant submits that the same purpose of reducing pendency applies to other aspects of the appeal process, including reopening prosecution. Specifically, these comments indicate that the appeal process should proceed in an orderly manner to decrease pendency, rather than to increase pendency—which is happening in this present application. Here, the claims were last amended in Appellant's response mailed December 30, 2003. No substantive amendments have been submitted since that time. Since that amendment, the Examiner stated that claims 12-22 were patentable over Guccione, issued a new rejection based on Blodget which Appellant has previously appealed, and reopened prosecution using similar rejections based on both Guccione and Blodget, despite the Examiner's concession that claims 12-22 overcome the rejections based on Guccione. Given that the Examiner continues to issue rejections based on old references, which Appellant has successfully argued over or for which Appellant has submitted a thorough declaration, and given

that the Examiner has reopened prosecution based on these same old references, it appears that the Examiner is simply attempting to avoid the appeal process. In other words, Appellant respectfully submits that the Examiner is denying timely prosecution of this application by preventing appellate review of the present application, in disregard for the stated purpose of the appeal process to reduce prosecution pendency. The Examiner has previously tried to prevent the appeals process by stating that the 1.31. Declaration was insufficient out of the blue.

The Examiner's action of reopening prosecution of the present case based on only references that were either overcome (Guccione) or pending appeal (Blodget) is a blatant disregard for Appellant's attempt to advance prosecution in a timely manner. In regard to the "new" rejection based on Guccione, Applicant respectfully submits that the same arguments apply to Guccione today as applied three years ago. In other words, the reasons why claims 12-22 are patentable over Guccione are the same today as they were three years ago when the Examiner stated that claims 12-22 overcame Guccione. However, right now Appellant addresses the procedural and logical correctness of reopening this case when the current appeals rules are intended to decrease—not increase—the pendency period for applications. As discussed above and below, virtually the same arguments found to be persuasive in this Appeal Brief can be found in the Appellant's response dated December 27, 2003. Therefore, Appellant respectfully requests that the Board acknowledge that reopening prosecution of the present application based on a previous reference, Guccione, which was overcome approximately three years ago, was improper.

B. Claims 12-22 are patentable over Guccione because Guccione does not teach or suggest all of the limitations of the claims.

Claims 12-22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Guccione. However, Applicant respectfully submits that claims 12-22 are patentable over Guccione because Guccione does not teach or suggest all of the limitations of the claims.

Guccione discloses a configurable programmable logic device (PLD), which receives program instructions on how to logically program its existing physical connections. Guccione, col. 3, line 66, to col. 4, line 10. The programming instructions/bits are loaded into the

programmable logic device to configure the device. Claim 1 of Guccione provides an overview of the disclosure:

1. A method for configuration of a programmable logic device that is coupled to a processor using a library that comprises logic core generators and one or more router core generators, each of the logic and router core generators including code that is executable and embodies design information, comprising the steps of: executing a program on the processor, the program including instructions that reference selected ones of the logic core generators for functions to be provided by the programmable logic device;

generating by one or more of the logic core generators in response to the program, logic core definitions that define at least two logic cores;

generating by the router generators in response to the program, at least one router core definition that defines a coupling of the logic cores in the programmable logic device;

generating programming bits from the logic core definitions and router core definition in response to the program; and

loading the programmable logic device with the programming bits in response to the program.

Col. 15, lines 1-10 (emphasis added).

Guccione warns that a user must take care when configuring a connection between two configurable blocks of logic (CLB) on the programmable logic device because the existing connection between CLBs may already be in use by another system resource. Specifically, Guccione states:

This router core object has a width of zero because it consumes no CLB logic. This core uses the direct connect signal lines between CLBs. Note that since the present method replaces a more elaborate automatic routing algorithm, it is left to the user to ensure that these routing resources are not in use.

Col. 11, lines 7-12 (emphasis added).

In other words, Guccione merely teaches using a programmable logic device with existing physical connections between the various cores. These physical connections are always there, and the logic simply turns the connections on or off. Guccione does not teach using a programmable logic device which has physical connections that can be selectively present or not present. For example, there is no teaching in Guccione of how to potentially physically remove an existing direct connect signal line between CLBs.

In contrast, independent claim 12 states:

12. A computer core having an interface to communicate with other cores, wherein the interface contains a plurality of interface signal carriers that are configurable, at compilation, such that at least of one of the interface signal carriers is selectively physically present in the interface or not physically present, wherein not physically present means that a route connection is not generated for an interface signal carrier selected to be not physically present.
(Emphasis added).

Given that Guccione does not disclose interface signal carriers that are configurable such that the interface signal carriers may be selectively physically present in the interface or not physically present, Appellant respectfully submits that claim 12 is patentable over Guccione. Given that claims 13-15 depend from and include the limitations of claim 12, Appellant submits that claims 13-15 are also patentable over Guccione. Accordingly, Appellant requests that the rejection of claims 12-15 under 35 U.S.C. § 103(a) be withdrawn.

Similarly, Appellant respectfully submits that claim 16 is also patentable over Guccione. Guccione discloses that a core on the disclosed programmable logic device is a block logic to provide an elementary level function such as adding, multiplying, on/off flip flops, etc. Specifically, Guccione discloses:

The core library 206 is a collection of macrocell or "core" generators that are implemented as Java classes. The cores are generally parameterizable and relocatable within a device. Examples of cores include counters, adders, multipliers, constant adders, constant multipliers, flip-flops and other standard logic and computation functions.
Col. 4, lines 39-45 (emphasis added).

Guccione also discloses:

Selected functions provided by the core library 206 (FIG. 2) are invoked at step 304 to generate logic core definitions. The functions selected are those required to generate one or more logic cores for implementation on the programmable logic device.
Col. 5, lines 39-43 (emphasis added).

In other words, Guccione merely discloses cores only on a programmable memory device. Guccione does not disclose a core with an interface on a system-on-a-chip (SoC).

New independent claim 16 states:

16. A core on a system on a chip having an interface, wherein the interface contains a plurality of interface signal carriers that are configurable, at compilation, such that at least of a first interface signal carriers is configurable to support different levels of functionality for the interface.

(Emphasis added).

Given that Guccione does not disclose a core on a system-on-a-chip that has an interface, which is configurable to support different levels of functionality for the interface, Appellant respectfully submits that claim 16 is patentable over Guccione. Given that claims 17 and 18 depend from and include the limitations of claim 16, Appellant submits that claims 17 and 18 are also patentable over Guccione. Accordingly, Appellant requests that the rejection of claims 16-18 under 35 U.S.C. § 103(a) be withdrawn.

Similarly, applicant respectfully submits new claim 19 is patentable over Guccione.

Claim 19 discloses:

19. A method for generating at compilation a core interface for a system on a chip to enable re-use of the core with a different interface configuration, the method comprising:

providing configurable source code representative of the core interface for the system on a chip and identifying parameters of the core interface;
defining configuration parameters of the core interface; and
generating the core interface for the system on a chip from the configurable source code representative of the core interface and the identified parameters of the core interface configurable in accordance with the defined configuration parameters of the core interface.

(Emphasis added).

As explained above, Guccione does not disclose a core interface for a core on a system-on-a-chip to enable re-use of the core with a different interface configuration. Moreover, Guccione does not disclose generating the core interface for the system-on-a-chip from the configurable source code representative of the core interface and the identified parameters of the core interface configurable.

Given that Guccione does not disclose all of the limitation of the claim, Appellant respectfully submits that claim 19 is patentable over Guccione. Given that claims 20-22 depend from and include the limitations of claim 19, Appellant submits that claims 20-22 are also patentable over Guccione. Accordingly, Appellant requests that the rejection of claims 19-22 under 35 U.S.C. § 103(a) be withdrawn.

- C. Claims 12-22 are patentable over Blodget because Appellant's Declaration under 37 C.F.R. § 1.131 establishes invention of the subject matter of the claims 12-22 prior to the effective date of Blodget.

Claims 12-22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Blodget. However, the current Office Action dismisses Appellant's previous appeal regarding the sufficiency of Appellant's Declaration under 37 U.S.C. § 1.131. In particular, the current Office Action restates the rejection based on Blodget which was the subject matter of the most appeal. Rather than allow the Board to address the merit of Appellant's Declaration, the Examiner reopened prosecution based on a "new" rejection (the rejection based on Guccione was, in fact, not new, as explained above), and restates the rejection based on Blodget which was the subject matter of the appeal. Thus, it appears that the Examiner is attempting to maintain the rejection based on Blodget, even though Appellant initiated the appeal to determine the merit of Appellant's declaration. Despite the Examiner's assertion that prosecution was reopened "in the interest of compact prosecution," this action by the Examiner merely delays Appellant's opportunity to have the merit of Appellant's Declaration properly reviewed.

Therefore, Appellant respectfully submits that Appellant's Declaration was proper and adequate to remove Blodget as a prior art reference, according to Appellant's arguments and remarks presented in the Appeal Brief filed December 27, 2004, and Appellant's Supplemental Appeal Brief filed October 6, 2005.

By way of review, Blodget qualifies as prior art only under 35 U.S.C. § 102(e) because its filing date of July 13, 2000 is earlier than Appellant's filing date of August 8, 2000, and its issue date of January 21, 2003 is later than Appellant's filing date. Appellant submitted a Declaration under 37 C.F.R. § 1.131 on August 17, 2004, with accompanying Exhibits, to establish that the invention as claimed in claims 12-22 was reduced to practice prior to the July 13, 2000 filing date of Blodget. Therefore, Blodget is not available as prior art under 35 U.S.C. § 102(e). In the Advisory Action mailed October 18, 2004, the Examiner indicated that the Declaration filed did not place the application in condition for allowance because "a review of the declaration under 37 CFR 1.131 and evidence submitted therein raises questions regarding the 35 USC 102(b) bar to patentability based upon public use or sale one year prior to the filing

of the instant application.” Advisory Action, October 18, 2004, p. 2. The Examiner did not indicate, in the Advisory Action or in subsequent telephone conversations, exactly what portions of the Declaration raised 35 U.S.C. § 102(b) questions. Appellant notes that among the Exhibits submitted with the Declaration filed on August 17, 2004, all but two dates were redacted from the Exhibits. The two revealed dates, September 16, 1999, and September 7, 1999, are the publication dates of two press releases presented as Exhibits E and F, respectively. Appellant notes that neither of these dates are more than one year prior to the filing date of the present application, which is August 8, 2000.

Moreover, the Declaration in point 2 first stated that the inventors reviewed the claims as they currently stand in Appendix A. All five inventors then declared in points 5 and 6 based on their review of the current claims that those concepts were contained in the Sonics SOC Integration Suite product as evidenced in their beliefs by the Purchase order and Invoice to VxTel. All five inventors next declared in point 7 based on their review of the current claims that those concepts were indeed contained in the selected sections of the product manual submitted as evidence. All five inventors also declared in points 8 and 9 based on their review of the current claims that those concepts were reduced to practice prior to July 13, 2000, as evidenced in their beliefs by the supporting Press Articles. Note that two of the individuals making this Declaration are no longer employed by assignee. Appellant, respectfully submit the unified declaration of five different individuals referencing the accompanying documentary evidence should be sufficient to establish a reduced to practice of the currently claimed invention prior to July 13, 2000. All five inventors also declared that the filing of the patent application was on or before a one year bar date.

Accordingly, Appellant respectfully requests that the Board decree some finality to the prosecution of this patent application. This patent application has withstood several office actions, an abandonment and subsequent revival due to a phone call with this same examiner trying to resolve a mistake on a PTO form send by this examiner, a telephone interview in which the Examiner conceded that the claims overcame the prior art, an appeal regarding the sufficiency of the inventor’s Declaration, and ultimately reopening prosecution based on the prior art that was previously overcome. The substantive merits of the claims have been thoroughly discussed and the Examiner even in at least the telephonic Interview Summary that the claims were different than the prior art. However, after all of this, the Examiner has issued

another office action rejection based on the already discussed and distinguished prior art. Additionally, when Appellant attempted to further prosecution and overcome another prior art by submitting a 1.131 declaration including its supporting documentation, the Examiner has taken steps to obstruct advancement of this application, rather than discuss the substantive merits of the claims. If the Board feels the 1.131 declaration including its supporting documentation are sufficient to establish an invention date prior to the reference's priority date, then the Appellant respectfully requests that the Board withdraw the rejection under 35 U.S.C. § 103(a) based on Blodget and decree a Notice of Allowance for this patent application. Further, if the Board agrees that Guccione disclosed a PLD with physical connections always present just logically turn on or off, then the Board needs to decree a Notice of Allowance for this patent application

VIII. CONCLUSION

Based on the foregoing, claims 12-22 are patentable over the cited references of Guccione and Blodget under 35 U.S.C. § 103(a). Thus, the rejections of claims 12-22 should be withdrawn. Accordingly, Appellant respectfully requests that the Board reverse the rejections of claims 12-22. Appellant is entitled to a full and through examination each time the PTO reviews the merits of this application. Accordingly, since there are no remaining grounds of rejection to be overcome, please direct the Examiner to enter a Notice of Allowance for claims 12-22. Alternatively, Appellant requests the Board to exercise its authority to enter a Notice of Allowance for claims 12-22.

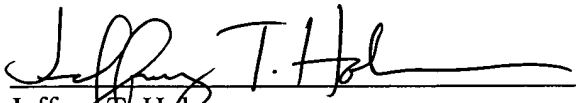
Additionally, Appellant notes that this is Appellant's second attempt to move the present application out of the Examiner's jurisdiction because the facts on the record indicate that the Examiner is simply stalling the prosecution of this patent application. Something should be done to fix this process.

If there are any additional charges, please charge Deposit Account No. 02-2666.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Date: 12/18/06
12400 Wilshire Boulevard
Seventh Floor
Los Angeles, CA 90025
(408) 720-8300


Jeffrey T. Holman
Reg. No. 51,812

IX. CLAIMS APPENDIX

Claims 1-11 (Canceled)

12. (Previously presented) A new computer core having an interface to communicate with other cores, wherein the interface contains a plurality of interface signal carriers that are configurable, at compilation, such that at least one of the interface signal carriers is selectively physically present in the interface or not physically present, wherein not physically present means that a route connection is not generated for an interface signal carrier selected to be not physically present.

13. (Previously presented) The computer core as set forth in claim 12, wherein the computer core is a core on a system on a chip and the other cores also belong to that system on a chip.

14. (Previously presented) The computer core as set forth in claim 12, wherein a first interface signal carrier is further configured to support different levels of functionality for the interface.

15. (Previously presented) The computer core as set forth in claim 14, wherein a signal carrier width of the first interface signal carrier is also configurable to support different signal widths.

16. (Previously presented) A core on a system on a chip having an interface, wherein the interface contains a plurality of interface signal carriers that are configurable, at compilation, such that a first interface signal carrier of the plurality of interface signal carriers is configurable to support different levels of functionality for the interface.

17. (Previously presented) The core as set forth in claim 16, wherein a signal carrier width of the first interface signal carrier is also configurable to support different signal widths.

18. (Previously presented) The core as set forth in claim 16, wherein the first interface signal

carrier is configurable, at compilation, such that the first interface signal carrier is selectively physically present in the interface or not physically present.

19. (Previously presented) A method for generating at compilation a core interface for a system on a chip to enable re-use of the core with a different interface configuration, the method comprising:

providing configurable source code representative of the core interface for the system on a chip and identifying parameters of the core interface;

defining configuration parameters of the core interface; and

generating the core interface for the system on a chip from the configurable source code representative of the core interface and the identified parameters of the core interface configurable in accordance with the defined configuration parameters of the core interface.

20. (Previously presented) The method as set forth in claim 19, wherein at least one of the configuration parameters of the core interface is defining whether a first interface signal carrier will be physically present in the core interface or not physically present.

21. (Previously presented) The method as set forth in claim 19, wherein at least one of the configuration parameters of the core interface is defining different levels of functionality that the core interface supports through a plurality of signal interface carriers.

22. (Previously presented) The method as set forth in claim 19, wherein at least one of the configuration parameters of the core interface is defining a signal width of a first interface signal carrier.

X. EVIDENCE APPENDIX

This Evidence Appendix includes a copy of the 1.131 Declaration, as well as the following documentation that was submitted during prosecution pursuant to 37 C.F.R. § 1.131:

Invoice (1 page)

Purchase Order (1 page)

User Reference Manual, including:

Cover Pages (2 pages)

Table of Contents (3 pages)

Chapter 3 – selected portions (3 pages)

Chapter 5 – selected portions (16 pages)

Reed Business Information Article (1 page)

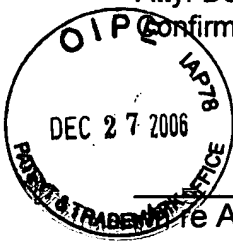
EE Times Article (3 pages)

XI. RELATED PROCEEDINGS APPENDIX

To the best of Applicants' knowledge, there are no appeals or interferences related to the present appeal that will directly affect, be directly affected by, or have a bearing on the Board's decision in the instant appeal.

Atty. Docket No.: 2998.P011

Confirmation No.: 5608



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Re Application of:

Drew Eric Wingard et al.

Application No.: 09/634,045

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CONFIGURABLE INTERFACE

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION UNDER 37 C.F.R. § 1.131

We, Drew Eric Wingard, Michael J. Meyer, Geert Rosseel, Lisa A. Robinson, and Jay S. Tomlinson, declare the following:

1. We are the inventors of the above identified patent application. We are also employees or former employees of the assignee, Sonics, Inc. (hereinafter "Sonics"), of the application.
2. We have reviewed the application, including the claims of the application, and we have also reviewed a copy of the current claims which are pending (a copy of which is attached as Exhibit A).
3. The declaration made herein is to establish reduction to practice prior to **July 13, 2000**, which is the effective filing date of U.S. Patent 6,510,546 to Blodget.

4. We reduced to practice the claimed invention (in the claims of Exhibit A) prior to July 13, 2000.

5. Exhibit B attached herewith is an Invoice from Sonics to VxTel, Inc. (hereinafter "VxTel"), describing the sale of the Sonics SOC Integration Suite product prior to July 13, 2000. The SOC Integration Suite product included embodiments of the claimed invention. Exhibit B demonstrates that the claimed invention was reduced to practice prior to July 13, 2000. Note that the invoice date and purchase amounts have been redacted.

6. Exhibit C attached herewith is a Purchase Order from VxTel to Sonics, describing the purchase of the Sonics Integration Suite product prior to July 13, 2000. The SOC Integration Suite product included embodiments of the claimed invention. Exhibit C demonstrates that the claimed invention was reduced to practice prior to July 13, 2000. Note that the purchase order date and purchase amounts have been redacted.

7. Exhibit D attached herewith is product manual for the Sonics Integration Suite product, entitled SOCIntegrator and SOCBuilder User Reference. The product manual accompanied the sale of the Sonics Integration product described above, prior to July 13, 2000. Embodiments of the invention are supported throughout the entire product manual, but are more specifically described starting at page 32, and in general in Chapter 5 at page 43 of the manual. Exhibit D demonstrates that the claimed invention was reduced to practice prior to July 13, 2000.

8. Exhibit E attached herewith is a press release from EDN dated September 16, 1999, entitled Design Suite Accelerates SOC Development. The press release describes some aspects of the functionality of the Sonics SOC Integration Suite. Exhibit E demonstrates that the claimed invention was reduced to practice prior to July 13, 2000.

9. Exhibit F attached herewith is a press release from EE Times dated September 7, 1999, entitled Sonics Spins SoC Plug-and-play Tool. The press release describes some aspects of the functionality of the Sonics SOC Integration Suite. Exhibit F demonstrates that the claimed invention was reduced to practice prior to July 13, 2000.

10. Based on the above description and as is evident from the attached exhibits, reduction to practice of the subject matter, for its intended purpose, was accomplished at least prior to July 13, 2000.

11. We declare, to the best of our knowledge, that all statements made in this document are true, and that all statements made on the information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under § 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the above-identified patent application or any patent issued thereon.

Dated: 8/10/2004

Drew Eric Wingard
Name: Drew Eric Wingard

Dated: 8/11/2004

Michael J. Meyer
Name: Michael J. Meyer

Dated: 8/11/2004

Geert Rosseel
Name: Geert Rosseel

Dated: 8/13/2004

Lisa A. Robinson
Name: Lisa A. Robinson

Dated: 8/11/2004

Jay S. Tomlinson
Name: Jay S. Tomlinson

**2440 W. El Camino Real, Suite 620
Mountain View, California 94040**

The logo for Sonics Inc. features a large, stylized, bold letter 'S' with a jagged, hand-drawn edge. Below the 'S', the words 'SONICS INC.' are written in a bold, sans-serif font, with 'SONICS' on the top line and 'INC.' on the bottom line. Underneath 'SONICS INC.', the words 'SYSTEMS ONICS' are written in a smaller, all-caps, sans-serif font. The entire logo is set against a dark, textured background.

DATE	INVOICE #
	30

BILL TO
VxTel, Inc. Attn: Sanjeev Renjen, PhD. 47697 Westinghouse Drive Suite 100 Fremont, CA 94539

SHIP TO
VxTel, Inc. Attn: Sanjeev Renjen, PhD. 47697 Westinghouse Drive Suite 100 Fremont, CA 94539

P.O. NO.	TERMS
51805	Net 30

DESCRIPTION	AMOUNT
Sonics Integration Architecture 2.1	.00
Sonics FastForward Suite 2.1	00
Sonics FastForward Annual Maintenance	00
<p>Thank you for your business.</p> <p>Total \$</p>	

VxTel, Inc.

47697 Westinghouse Drive

Suite 100

Fremont, CA 94539

Tel: (510) 979-2100 Fax: (510) 979-2107

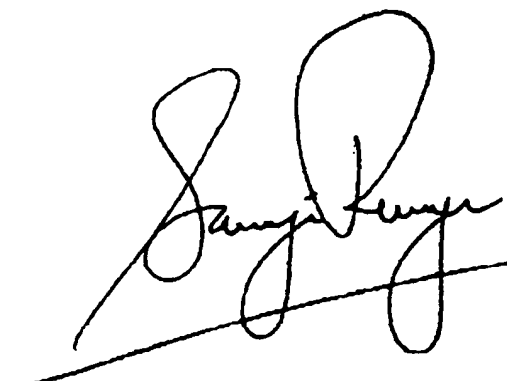
Purchase Order

DATE	P.O. NO.
	51805

Vendor
Sonics, Inc. 2440 West El Camino Real, Suite 620 Mountain View, CA 94040

SHIP TO
George Moussa 984-2 Alpine Terrace Sunnyvale, CA 94086

QUOTE NO.	TERMS	SHIP DATE	SHIP VIA	CONTACT
VX122399-TY	Net 30 Days		Electronic	Sanjeev Rensen

DESCRIPTION	QTY	RATE	AMOUNT
Sonics IA - Integrated Architecture Core License - Release 2.0	1	.00	.00
Sonics SOC Integration Suite - Annual Subscription price includes one license each of Sonics SOCIntegrator, SOC Builder and Core Creator	1	.00	.00
Sonics SOC Integration Suite - Annual Maintenance Sent Via Electronic Transmission	1	.00	.00
			
Total			\$



SONICS INC
SYSTEMS ON ICS

FastForward™ SOC Integration System

SOC Integration Suite

SOCIntegrator™ and SOCBuilder™ User Reference

Product Version: 2.0

SONICS, INC.

FastForward™ SOC Integration System

SOC Integration Suite

**SOCIntegrator and SOCBUILDER
User Reference**

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Package Core

The final step of *CoreCreator* is the packaging of the core. In this step, the various representations of the core (such as RTL or gate-level netlist), synthesis scripts and configuration files (if applicable), test benches, and documentation, are collected together into a single package for convenient delivery to the system integrator.

The items to be included in the core package are specified using a package file. This file needs to be set up using a text editor, no matter whether the GUI or command line interface is used. In the GUI, there is a separate flow button for packaging the core. Refer to the *CoreCreator User Reference* for a description of this flow function. From the command line, core packaging is achieved using the **corepackage** utility. The **corepackage** utility is described in the *CoreCreator User Reference*.

SOCIntegrator and SOCCreator

This section describes the steps required to go from a set of packaged cores to a completely integrated SOC as represented by a mapped netlist. Refer to Figure 19 on page 28.

Import Core

Packaged cores must be unpackaged to bring them into the *SOCIntegrator* environment. In the *SOCCreator* GUI, there is an Import Core function to achieve this. From the command line, simply use the Unix **tar** command to extract the cores that were packaged in *CoreCreator*.

Connect & Configure

The SOC is assembled out of a set of cores and a SiliconBackplane. The cores are instantiated and plugged into the SiliconBackplane. Next, the SiliconBackplane and its agents are configured. At this stage the basic SiliconBackplane parameters (address map, bandwidth allocation, flag configuration) and many other agent options are configured. The goal of this step is to create a fully-connected SOC that satisfies the overall system requirements. Requirements such as performance, protocol adherence, chip area, and timing are tested via simulation and synthesis, and adjustments are made to the configuration as needed.

In the GUI, the SiliconBackplane and the cores are instantiated by selecting them from the core catalog. The cores are connected to the SiliconBackplane in the design window. The design window is also used for configuring the SiliconBackplane and its agents, by double-clicking on the entity to be configured. The operations available from the *SOCCreator* design window are described in this document.

From the command line interface, connection and configuration are achieved by describing the SOC in the RTL configuration file. The format of this file is described in the *SonicsIA Hardware Reference*.

Create Netlist

Once the connection and configuration of the SOC has been described, a netlist can be created. In this step, the agents making up the SiliconBackplane are created, each according to the requirements imposed by their configuration, the attached core, and the system. In addition, the SiliconBackplane agents and cores are all wired together to form the chip.

In order to prepare the system for simulation, a system-level test bench is also needed, which at a minimum provides a clock and reset signal to the chip. A sample minimum system test bench is included in the *SonicsIA Hardware Reference*. More typically, there are additional files to describe other pieces of the chip (such as the I/O pad ring) and other pieces of the system-level test bench (such as DRAM models).

In the GUI, there is a dedicated flow button for netlist creation. From the command line interface, the **soccomp** tool accomplishes this step. The **soccomp** command is described in Chapter 6.

Simulation

Now the system is ready to be simulated. As in *CoreCreator*, simulation is divided into three steps: prepare simulation, simulate, and analyze results. Once again, there is a test bench section in the chip RTL configuration file that associates a method with each chip core instantiation for each step of simulation. There is also a test file that specifies which methods to run and what arguments (specifying the test programs or analysis options, for example) to use for a given simulation run. See the *SonicsIA Hardware Reference* for more details about the test bench, as well as a sample test file.

In the GUI, the test bench section is set up using the Define Test Bench flow button. The test file is created using a text editor and selected using the select test file flow button. Once these set-up steps have been accomplished, the three steps of simulation are each kicked off with their individual flow buttons. Refer to Chapter 4 for a description of these flow functions.

From the command line interface, the test bench section is inserted into the chip RTL configuration file using a text editor. Similarly, the test file is created using a text editor. The *SonicsIA Hardware Reference* describes the format of these files. The three steps of simulation are accomplished with the **simprepare**, **simrun**, and **simanalyze** commands. Alternatively, all three can be launched in sequence with the **simall** command. Refer to the tool descriptions in Chapter 6 for more information about these commands.

Synthesize

Logic synthesis is the primary function of *SOCBuilder*. During synthesis, the core and agent RTL files as well as the SOC netlist created earlier are mapped to a specific cell library using a commercial synthesis tool. The output of this step is a mapped netlist that is combined with additional pieces, clocking, test and pad structures to complete the SOC chip design.

In order to run synthesis, a number of items must first be set up. Global parameters such as clock constraints and technology-dependent parameters are specified in the chip synthesis configuration file. Technology-dependent parameters can be extracted from the target cell library using the Technology Compiler tool, **techcomp**, from the command line. For each core, there are core synthesis constraint files to describe the core's timing constraints and a synthesis script to guide the core through synthesis. Ideally, these files are delivered with each packaged core, but if missing they can be entered at this point. Also, any constraints supplied with the core synthesis configuration files can be overridden from the chip synthesis configuration file. Refer to the *SonicsIA Hardware Reference* for an example of a chip synthesis configuration file, as well as for the syntax of that file. See Chapter 6 for more information about the parameters of the Technology Compiler, **techcomp**.

In the GUI, the chip synthesis configuration file is created and updated by supplying the required technology and clocking constraints. The technology information is added into the file using the Edit > Technology menu item, and clocking information is added using the Edit > Clocks menu item. Port constraints, the default values of which come from the corresponding core synthesis configuration files, can be modified through the configuration panes of the cores and agents. Once setup is complete, synthesis is launched using the Synthesize flow button; see Chapter 4.

From the command line interface, technology information, clocking constraints, as well as port constraint overrides are specified by using a text editor to create a chip synthesis configuration file. The format of this file is specified in the *SonicsIA Hardware Reference*. Synthesis is then run using **socmap**. Refer to Chapter 6 for more information about the **socmap** utility.

5 ***Configuring Your Design***

The following sections give a brief overview of each GUI configuration dialog. Complete, parameter-specific configuration information can be found in the *SonicsIA Configuration Guide* and the *SonicsIA Hardware Reference*.

As described on page 12, there are several ways to access the configuration dialog of *any* configurable object, whether it is a SiliconBackplane, agent, core, connection, or monitor:

- Select the object to configure and choose Edit > Configure.
- Double-click on the configurable object.
- Place the mouse pointer over the configurable object, right-click, and choose Configure from the Shortcut Menu.

You may also configure your system by manually editing RTL configuration files (*.rtl.conf) and synthesis constraint files (*.syn.conf). To do so correctly, however, requires a detailed understanding of SonicsIA and the syntax of these configuration files.

Dialog Basics

Options in dialogs and panes appear grayed out when they are not applicable. They are dynamically enabled or disabled depending upon your configuration.

The number and type of configuration options available depend on the object being configured. Some instances have a large number of configurable options while others have a small number in comparison.

The term “dialog” refers to any query window that appears, asking you to enter or verify information. Sometimes it contains more information than fits in one window so the dialog is divided into tabbed panes. A “pane” describes the information under one tab.

Buttons labeled OK and Cancel appear at the bottom of dialog and pane windows. Press OK to save any changes made to a window and exit. Press Cancel to exit without saving changes.

Note that switching from one pane to another on a multi-tabbed dialog saves any changes made to a pane and cannot be undone with the Undo command. To avoid saving changes to a pane, be sure to press Cancel before moving to another pane.

A default name appears whenever you create an object, but this name can be altered in the name field on the configuration dialog. Almost all names are visible from the design window. (The OCP monitor and external interface are the only objects whose names can only be seen through the configuration dialog and not through the design window.)

Balloon Help

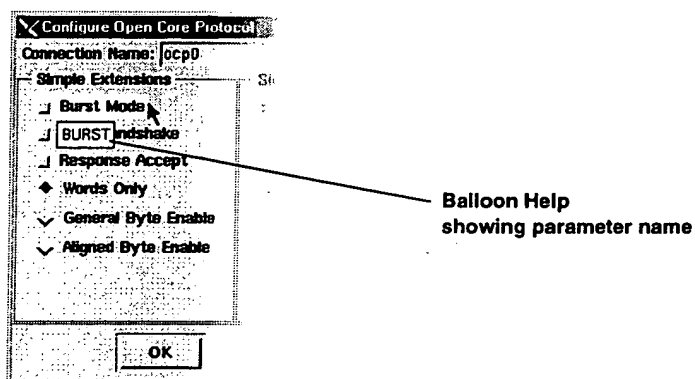
To learn which parameter corresponds to a particular GUI field, move the mouse pointer over the option in the configuration pane and hold the pointer still for a moment. The parameter name appears in the balloon help. Parameter names are used in text files such as the `rtl.conf` file. They are also useful for identifying and referencing parameters in the *SonicsIA Hardware Reference* or *SonicsIA Configuration Guide*.

The balloon help message on a *locked*, or non-configurable parameter includes the text (Locked by Core) under the parameter name, see Figure 24 for an example.

Special balloon help appears for Clocking panes and for Input Ports and Output Ports panes. When the cursor rests over a value, the valid range for that parameter and attribute appears in a balloon help bubble. Figure 25 contains an example.

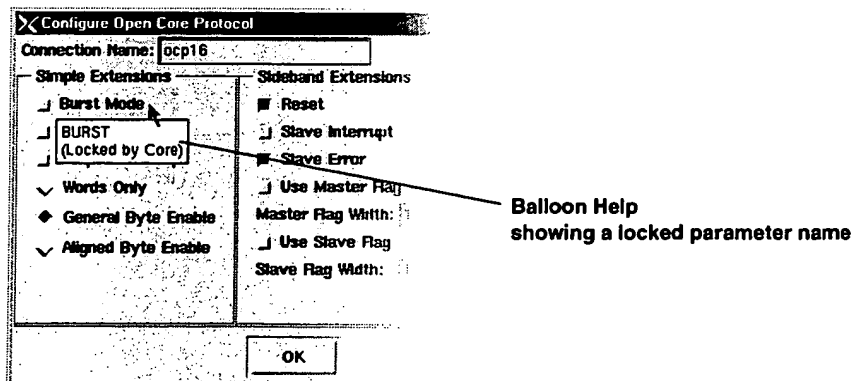
In the following figure, the pointer rests over the OCP burst mode option and the parameter name, BURST, appears in the balloon help.

Figure 23 Sample Balloon Help, Standard



The next figure shows an OCP dialog with locked parameters. The cursor rests over a non-configurable parameter so the balloon help message includes (Locked by Core) under the parameter name, BURST. If you are reading this document in color, notice that the dialog text also appears in a different color (the default is dark blue) to indicate the value is locked.

Figure 24 Sample Balloon Help Showing a Locked Value



In the figure below, the cursor rests over a parameter attribute and the balloon help shows the valid range for the value.

Figure 25 Sample Balloon Help Showing Valid Range

Configure Target Agent Module

Structural | Clocking | Bypass | Registers | QCP tp | Input Ports | OK

Edit Expression:

Name	Setup Time (ns)	Hold Time (ns)	Driving Cell
tpSndAccept_I	5.247	0.0	ias/Invtr_2xx
tpSData_I	2.6466	0.0	ias/Invtr_2xx
tpSFlag_I	0.8712	0.0	ias/Invtr_2xx
tpSResp_I	6.5208	0.0	ias/Invtr_2xx
tpThreadID_I	5.1 range (5.434,20.0)		ias/Invtr_2xx
tpStatus_I	0.462	0.0	ias/Invtr_2xx
S0sbAssert_fmid_I	0.8844	0.0	ias/Invtr_2xx
S1sbAddr_fmid_I	0.8844	0.0	ias/Invtr_2xx
S1sbBurst_fmid_I	0.8844	0.0	ias/Invtr_2xx
S1sbByteEn_fmid_I	0.8844	0.0	ias/Invtr_2xx
S1sbCmd_fmid_I	0.8844	0.0	ias/Invtr_2xx
S1sbConnID_fmid_I	0.8844	0.0	ias/Invtr_2xx
S1sbData_fmid_I	0.8844	0.0	ias/Invtr_2xx
S1sbFlagNum_fmid_I	0.8844	0.0	ias/Invtr_2xx
S1sbResp_fmid_I	0.8844	0.0	ias/Invtr_2xx

OK

Balloon Help showing the valid range for a value

List of Configuration Dialogs

The following lists display the name and page number for each dialog description, both in order of appearance and in alphabetical order.

In Order of Appearance

Configure Chip	48
Configure External Interface	50
Configure Open Core Protocol	51
Configure Open Core Protocol Monitor	53
Introduction to QC and QS Models	54
Configure QCMaster	59
Configure QCSlave	60
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Configure SiliconBackplane	64
Configure SiliconBackplane Monitor	72
Configure TargetAgent Module	73
Configure InitiatorAgent Module	80
Configure ServiceAgent Module	85

In Alphabetical Order

Configure Chip	48
Configure External Interface	50
Configure InitiatorAgent Module	80
Configure Open Core Protocol	51
Configure Open Core Protocol Monitor	53
Configure QCMaster	59
Configure QCSlave	60
Configure QCSplitMaster and QCSplitSlave	63
Configure ServiceAgent Module	85
Configure SiliconBackplane	64
Configure SiliconBackplane Monitor	72
Configure TargetAgent Module	73
Introduction to QC and QS Models	54

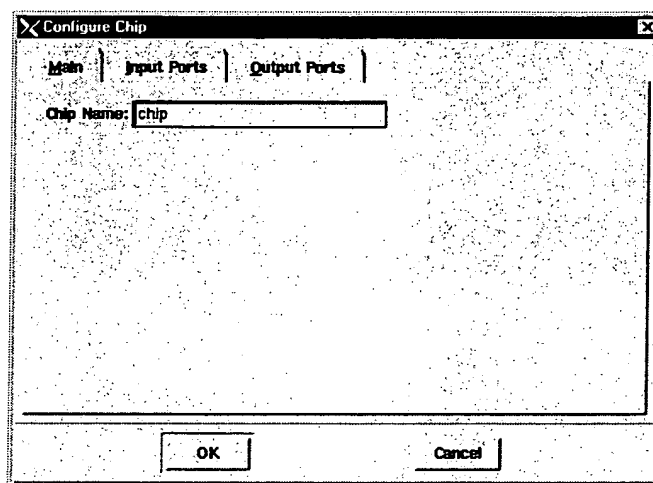
Configure Chip

The Configure Chip dialog allows you to name your design and to specify design-level settings for input and output ports.

Main Pane

As described in Chapter 1, "The Basics", you can rename your chip from the Main Pane of the Configure Chip dialog. There are several different files and filenames associated with a chip. The chip name is the name in the chip command of the rtl.conf file and is used as the name of the top Verilog or VHDL module. This chip name also serves as the default base for the chip filename (rtl.conf file), and for the synthesis constraints file (syn.conf file).

Figure 26 Sample Configure Chip, Main Pane



Input Ports and Output Ports Panes

These values are the port synthesis constraint settings. The size of these panes varies and depends on the complexity of the design.

Input ports panes and output ports panes remain disabled until technology parameters and clock information are defined.

Ports appear on the pane sorted by interface then by port name.

Navigating the Table

The ports pane resembles a spreadsheet: you can navigate the table using the up and down arrows, Shift key + left and right arrows, and the Tab key. The pane, however, does not automatically scroll to follow the cursor so you must use the scroll bar along the right side of the window to page up and down the list.

You can also use keyboard shortcuts to copy and paste values, Ctrl+C and Ctrl+V, respectively. The left and right arrows (without the Shift key) allow you to move through text character by character.

Values and Expressions

Values associated with a port appear in table format to the right of the name. To change a value: click on the value and enter a new one.

To edit a Tcl expression: click on the value, view the expression in the Edit Expression line at the top of the pane, key in any changes to the expression in that line, and press Return. A recalculated value appears.

Figure 27 Sample Configure Chip, Input Ports Pane

Name	Setup Time (ns)	Hold Time (ns)	Driving Cell	Maximum Fanout
sbRst_i	4.5	0.0	_core/or2c2/V	0.0
emem0RData_i	4.5	0.0	_core/or2c2/V	0.0
snoopctrl0SnoopEnable_i	4.5	0.0	_core/or2c2/V	0.0
snoopctrl0SmClk_i	4.5	0.0	_core/or2c2/V	0.0

Figure 28 Sample Configure Chip, Output Ports Pane

Name	Clock To Out Max (ns)	Clock To Out Min (ns)	Load Cell	Loads
emem0Addr_o	1.5625	0.0	nand2a0/A	4.0
emem0Data_We_o	1.5625	0.0	nand2a0/A	4.0
emem0OE_o	1.5625	0.0	nand2a0/A	4.0
emem0RP_o	1.5625	0.0	nand2a0/A	4.0
emem0WData_o	1.5625	0.0	nand2a0/A	4.0
emem0WE_o	1.5625	0.0	nand2a0/A	4.0
snoopdata0SnoopDataOE_o	1.5625	0.0	nand2a0/A	4.0

Configure External Interface

An external interface provides a connection to the chip I/O pads or to parts of the design that are not described in the chip file.

From the configuration dialog for an external interface, you can alter the interface name and interface type, as well as view the bundle type. To change the name of the interface, enter the name in the "Interface Name" field. To change the interface type, click on the upside-down triangle to see the available options for the currently selected external interface and select the appropriate interface type. The interface types available depend on the core (or agent) to which the currently selected external interface is connected. The bundle type is also determined by the core (or agent), but it is not configurable so it appears grayed out.

Figure 29 Sample Configure External Interface Dialog, Example 1

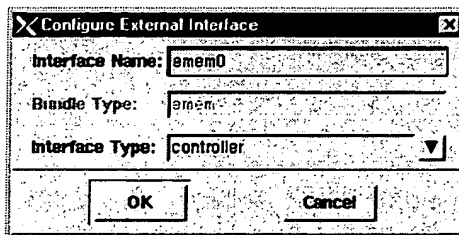
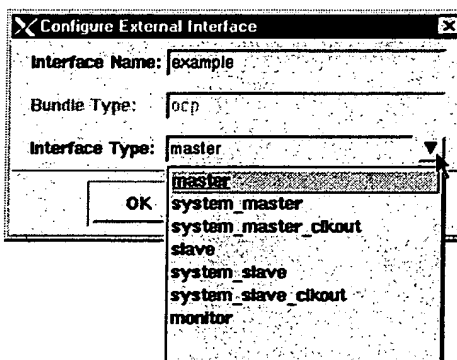


Figure 30 Sample Configure External Interface Dialog, Example 2



Configure Open Core Protocol

The OCP defines a family of point-to-point, bus-independent interfaces using a master-slave transfer model. This dialog allows you to view or define the specific characteristics of an OCP interface or connection. The designer of an individual core may specify a member of the OCP family that matches the capabilities of the core. The family members differ based upon data transfer model, sideband control signaling, and support for concurrency.

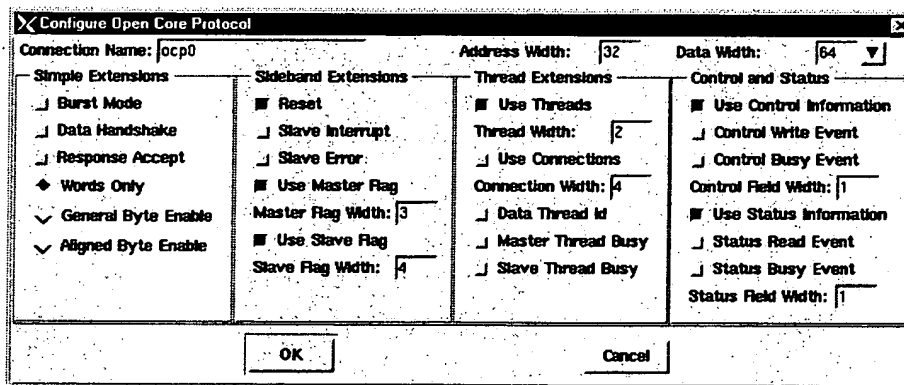
Specific OCP connections *inherit* restrictions from the cores to which they connect. These restrictions frequently prevent you from modifying an OCP parameter that has been pre-determined by an attached core. The full range of family members is available only when both sides of the connection are not restricted. This is typically only true when a flexible behavioral model (such as QCMaster or QCSlave) is attached to a flexible SiliconBackplane agent (such as InitiatorAgent or TargetAgent, respectively).

If any configuration parameters have been inherited from a core, then those parameters appear locked on this dialog. The balloon help message on a locked, or non-configurable parameter includes the text (Locked by Core) under the parameter name, see Figure 24 for an example. The dialog text also appears in a different color than configurable settings (the default “locked” color is dark blue).

You can access OCP settings by configuring the *connection* on the *OCP dialog*. An example dialog appears in Figure 31. You can also access OCP settings by configuring the *core*. This is useful when you have several OCPs on a core and want to modify all the OCP settings at the same time. A core's configuration dialog contains an *OCP pane*¹ for each OCP module interface. An example pane follows in Figure 32 on page 52.

Note that in order to change the connection name for an OCP, you need to change this name on the OCP connection dialog (not on the core dialog or OCP monitor dialog).

Figure 31 Sample Configure Open Core Protocol Dialog



1. The term “dialog” refers to any query window that appears, asking you to enter or verify information. Sometimes it contains more information than fits in one window so the dialog is divided into tabbed panes. A “pane” describes the information under one tab.

Figure 32 Sample Configure Open Core Protocol Pane

Configure QCMaster

Main | QCP Ip

Connection Name: ocpu Address Width: 32 Data Width: 84

Simple Extensions	Sideband Extensions	Thread Extensions	Control and Status
<input type="checkbox"/> Burst Mode	<input checked="" type="checkbox"/> Reset	<input checked="" type="checkbox"/> Use Threads	<input checked="" type="checkbox"/> Use Control Information
<input type="checkbox"/> Data Handshake	<input type="checkbox"/> Slave Interrupt	Thread Width: 1	<input type="checkbox"/> Control Write Event
<input type="checkbox"/> Response Accept	<input type="checkbox"/> Slave Error	<input type="checkbox"/> Use Connections	<input type="checkbox"/> Control Busy Event
<input checked="" type="checkbox"/> Words Only	<input checked="" type="checkbox"/> Use Master Flag	Connection Width: 4	Control Field Width: 1
<input checked="" type="checkbox"/> General Byte Enable	Master Flag Width: 1	<input type="checkbox"/> Data Thread Id	<input checked="" type="checkbox"/> Use Status Information
<input checked="" type="checkbox"/> Aligned Byte Enable	<input checked="" type="checkbox"/> Use Slave Flag	<input type="checkbox"/> Master Thread Busy	<input type="checkbox"/> Status Read Event
	Slave Flag Width: 1	<input type="checkbox"/> Slave Thread Busy	<input type="checkbox"/> Status Busy Event
			Status Field Width: 1

OK Cancel

For more information about OCP, please refer to the *Open Core Protocol Hardware Reference*. For specifics on parameter configuration, consult the *SonicsIA Configuration Guide*.

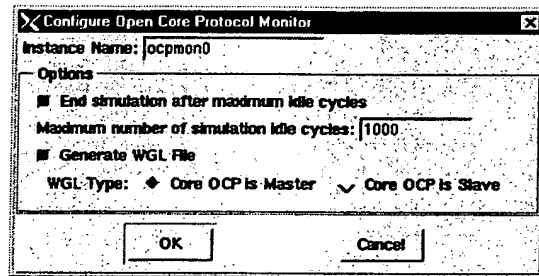
Configure Open Core Protocol Monitor

An OCP monitor is a behavioral module that logs activity on an OCP connection. These logs can be post-processed using the OCP tools.

In addition to logging activity on the OCP, an OCP monitor can be configured to end the simulation when the attached OCP has been idle for a specified number of cycles. To force such an exit, generally speaking, only one OCP monitor in the design needs to be configured to do so.

The OCP monitor can also generate a Waveform Generation Language (WGL) file for later use in a manufacturing test environment.

Figure 33 Sample Configure Open Core Protocol Monitor Dialog



Introduction to QC and QS Models

The QC and QS models are behavioral models that you can use in your design to model cores or to model the rest of the system.

QC stands for Quick Core; QC models are used in *SOCCreator*. A Quick Core Master, QCMaster, models a master core. Similarly, a Quick Core Slave, QCSlave, models a slave core.

QS stands for Quick System; QS models are used in *CoreCreator* (but are also available in *SOCCreator*). A Quick System Master, QSMaster, models the rest of the system to a slave core. And similarly, a Quick System Slave, QSSlave, models the rest of the system to a master core.

Figure 34 QCMaster and QCSlave in SOCCreator

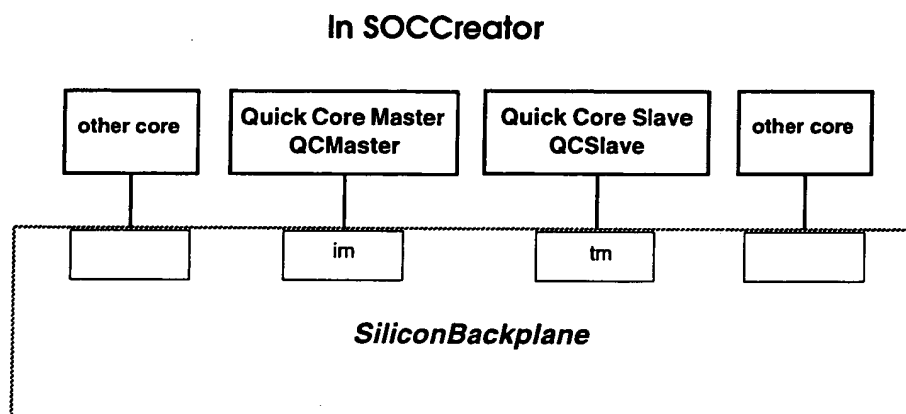
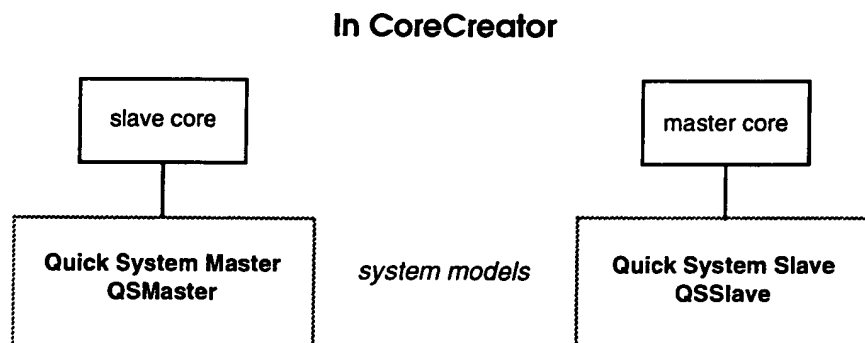


Figure 35 QSMaster and QSSlave in CoreCreator



OCP Pane

OCP panes only appear in instances with configurable OCP interfaces. The label that appears at the top of an OCP pane is the instance name of the port that the pane configures.

For more information, refer to “Configure Open Core Protocol” on page 51.

Input Ports and Output Ports Panes

These values are the port synthesis constraint settings. The size of these panes varies and depends on the complexity of the design.

Input ports panes and output ports panes remain disabled until technology parameters and clock information are defined.

Ports appear on the pane sorted by interface then by port name; ip come first, then tp, followed by the rest of the interfaces in alphabetical order.

Navigating the Table

The ports pane resembles a spreadsheet: you can navigate the table using the up and down arrows, Shift key + left and right arrows, and the Tab key. The pane, however, does not automatically scroll to follow the cursor so you must use the scroll bar along the right side of the window to page up and down the list.

You can also use keyboard shortcuts to copy and paste values, Ctrl+C and Ctrl+V, respectively. The left and right arrows (without the Shift key) allow you to move through text character by character.

Values and Expressions

Values associated with a port appear in table format to the right of the name. To change a value: click on the value and enter a new one.

To edit a Tcl expression: click on the value, view the expression in the Edit Expression line at the top of the pane, key in any changes to the expression in that line, and press Return. A recalculated value appears.

For specifics on parameter configuration, please consult the *SonicsIA Configuration Guide*.

Input Ports Pane

Figure 61 Sample Configure TargetAgent Module, Input Ports Pane

Configure TargetAgent Module

Structural | Docking | Bypass | Registers | QCP tp | Input Ports | Output Ports

Edit Expression: [expr \$clockperiod * 0.45]

Name	Setup Time (ns)	Hold Time (ns)	Driving Cell	Maximum Fanout
tpSndAccept_i	5.4	0.0	_core/or2c2/Y	0.0
tpSData_i	3.0	0.0	_core/or2c2/Y	0.0
tpSError_i	7.2	0.0	_core/or2c2/Y	0.0
tpSResp_i	0	0.0	_core/or2c2/Y	0.0
S0sbAssert_fmld_i	1.2	0.0	_core/or2c2/Y	0.0
S1sbAddr_fmld_i	1.2	0.0	_core/or2c2/Y	0.0
S1sbBurst_fmld_i	1.2	0.0	_core/or2c2/Y	0.0
S1sbByteEn_fmld_i	1.2	0.0	_core/or2c2/Y	0.0
S1sbCmd_fmld_i	1.2	0.0	_core/or2c2/Y	0.0
S1sbConnID_fmld_i	1.2	0.0	_core/or2c2/Y	0.0
SMsbData_fmld_i	1.2	0.0	_core/or2c2/Y	0.0
SMsbFlagNum_fmld_i	1.2	0.0	_core/or2c2/Y	0.0
SMsbResp_fmld_i	1.2	0.0	_core/or2c2/Y	0.0
SMsbError_fmld_i	1.2	0.0	_core/or2c2/Y	0.0
shCkReset_n_fmld_i	1.2	0.0	_core/or2c2/Y	0.0

OK Cancel

Output Ports Pane

Figure 62 Sample Configure TargetAgent Module, Output Ports Pane

Configure TargetAgent Module

Structural | Docking | Bypass | Registers | QCP tp | Input Ports | Output Ports

Edit Expression:

Name	Clock To Out Max (ns)	Clock To Out Min (ns)	Load Cell	Loads	Routing Delay (ns)	Routing Res. (kOhm)	Routing Cap. (pF)
tpCk_o	1.5	0.0	nand2a0/A	4.0	0.0	0.0	0.2
tpControl_o	0.0	0.0	nand2a0/A	4.0	0.0	0.0	0.2
tpMAddr_o	7.2	0.0	nand2a0/A	4.0	0.0	0.0	0.2
tpMByteEn_o	7.2	0.0	nand2a0/A	4.0	0.0	0.0	0.2
tpMCmd_o	7.2	0.0	nand2a0/A	4.0	0.0	0.0	0.2
tpMData_o	7.2	0.0	nand2a0/A	4.0	0.0	0.0	0.2
tpReset_no	1.0	0.0	nand2a0/A	4.0	0.0	0.0	0.2
S0sbAssert_fmld_o	1.2	0.0	nand2a0/A	4.0	0.0	0.0	0.5
S1sbAddr_fmld_o	1.2	0.0	nand2a0/A	4.0	0.0	0.0	0.5
S1sbBurst_fmld_o	1.2	0.0	nand2a0/A	4.0	0.0	0.0	0.5
S1sbByteEn_fmld_o	1.2	0.0	nand2a0/A	4.0	0.0	0.0	0.5
S1sbCmd_fmld_o	1.2	0.0	nand2a0/A	4.0	0.0	0.0	0.5
S1sbConnID_fmld_o	1.2	0.0	nand2a0/A	4.0	0.0	0.0	0.5
SMsbData_fmld_o	1.2	0.0	nand2a0/A	4.0	0.0	0.0	0.5
SMsbFlagNum_fmld_o	1.2	0.0	nand2a0/A	4.0	0.0	0.0	0.5

OK Cancel

Configure InitiatorAgent Module

The InitiatorAgent Module (IM) is a SiliconBackplane agent that receives OCP requests from an attached master IP core and converts them into legal SiliconBackplane requests. The configuration of an IM's OCP interface is inherited from the characteristics of the attached core. Like the rest of the SiliconBackplane communication system, the configured IM is produced by the **Create Netlist** or **soccomp** command.

Note that many of the IM panes include sections repeated from the TargetAgent Module, since the IM can include an embedded TargetAgent Module to support cores that are both system initiators and system targets (such as DMA engines).

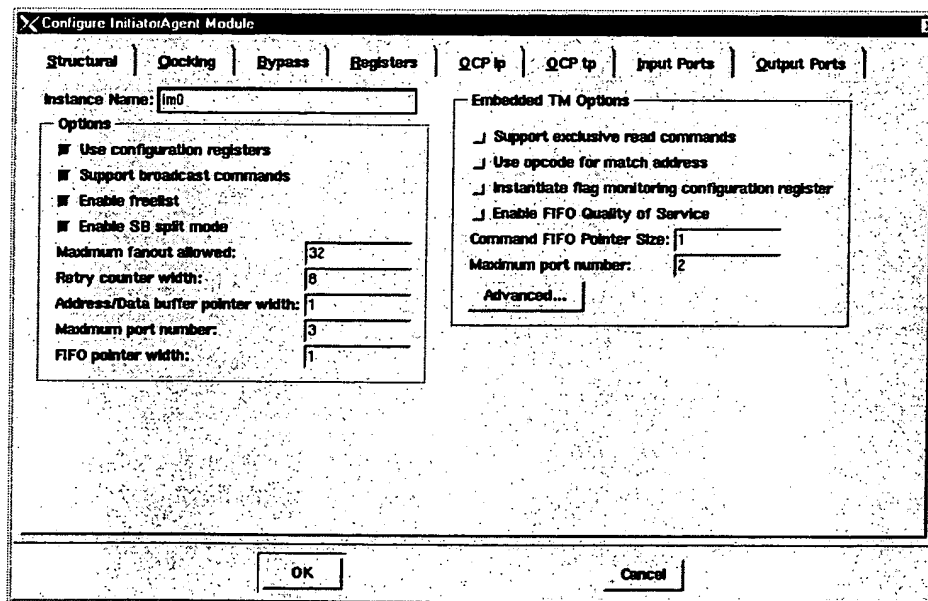
If the IM has an embedded TM, then the TM configuration can be made through this dialog. Otherwise, the embedded TM sections are grayed out because they are not applicable.

Structural Pane

The Structural Pane provides access to FIFO buffer depth, buffer sharing, and other structural parameters of the InitiatorAgent Module. This pane also provides access to TM structural parameters, whenever an IM includes an embedded TM.

For specifics on parameter configuration, please consult the *SonicsIA Configuration Guide*.

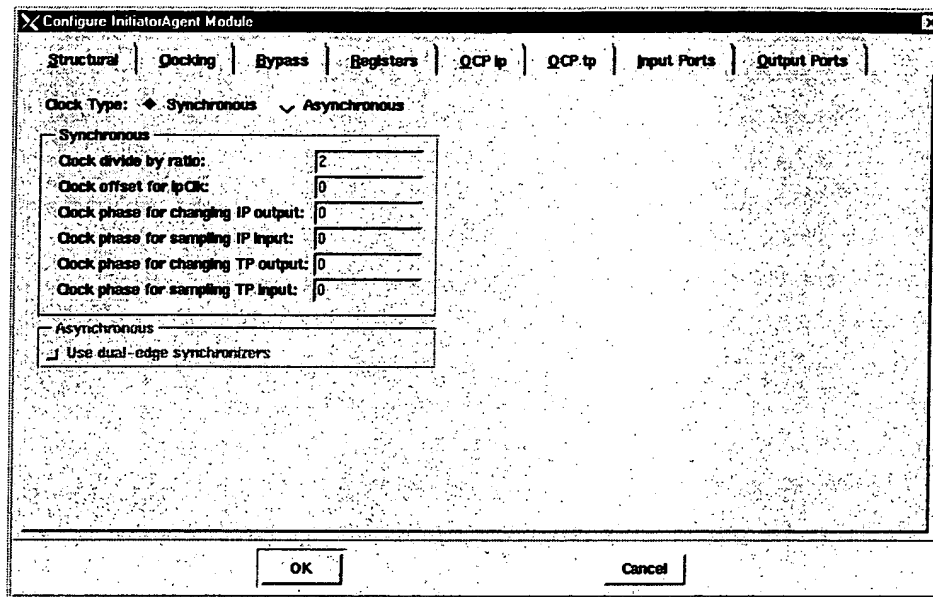
Figure 63 Sample Configure InitiatorAgent Module, Structural Pane



Clocking Pane

The Clocking Pane is very similar to that of the TargetAgent Module. The only extension is to provide separate control over fast IM to slow core timing parameters between the IM's slave and the core's master OCP interfaces.

Figure 64 Sample Configure InitiatorAgent Module, Clocking Pane



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Design suite accelerates SOC development

-- 9/16/1999
EDN

You use Sonics' FastForward integration system to develop your system-on-chip (SOC) designs. The system contains intellectual property (IP) that aids multiple-core integration and communication, the Sonics Integration Architecture (SonicsIA), and the Sonics Integration Suite of design tools.

SonicsIA's configurable, modular architecture has a standardized core interface and communication protocol between various cores, such as CPUs, memory blocks, and peripheral blocks. The architecture provides latency and bandwidth service to the cores, along with managing address mapping, control flow, interrupts, and other communication needs.

SonicsIA includes SiliconBackplane, Open Core Protocol, and MultiChip Backplane. SiliconBackplane contains the protocols and interconnect structure to manage interblock communications. SiliconBackplane is a processor-independent, distributed, multiple-master/slave, memory-mapped I/O protocol. It provides both the physical bus and the bus-arbitration functions, merging features such as address-based selection, read and write transfers, and pipelining.

Open Core Protocol is an open standard defining a generic-core "bus wrapper," letting you develop cores independently of an on-chip bus configuration. The Protocol is a synchronous read/write protocol with variable widths and flow control connecting cores to the SiliconBackplane. Open Core Protocol makes the bus conform to a core's needs rather than having you develop cores to meet bus specifications. MultiChip Backplane extends the on-chip SiliconBackplane for chip-to-chip communications. This backplane also lets you verify cores at speeds as high as 400 Mbytes/sec.

The Sonics Integration Suite configures SonicsIA for a design's application and generates a top-level synthesized chip netlist for placement and routing. According to Sonics, an SOC employing SonicsIA and designed with the Integration Suite usually needs only one place-and-route operation. The Suite contains the SOCIntegrator for structural design and functional simulation, and SOCBuilder for driving logic-synthesis, timing-analysis, and test-coverage design tools. The Integration Suite also includes CoreCreator for developing, validating, and preparing cores for reuse. CoreCreator helps develop core representations, including instruction-set simulator and behavioral models, RTL description, testbench, synthesis scripts, and test vectors, that you need during various parts of your design.

FastForward, with SonicsIA and Sonics Integration Suite, runs on Unix platforms. The Sonics Integration Suite has a \$64,500 annual license fee. FastForward license fees vary, depending on included core and tool license fees.

Sonics, 1-650-938-2500, www.sonicsinc.com.

—by Jim Lipman

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Sonics spins SoC plug-and-play tool

By Michael Santarini, EE Times

September 07, 1999 (1:25 PM EDT)

URL: <http://www.eetimes.com/article/showArticle.ihtml?articleId=18302778>

MOUNTAIN VIEW, Calif. — Startup Sonics Inc. has announced a new breed of technology that it says enables the plug-and-play of silicon intellectual-property while giving designers greater visibility into a design's interconnect.

The company's FastForward SoC Rapid Integration System promises to allow designers to integrate multiple cores and logic blocks quickly on one chip via a backplane, sidestepping the use of multiple chip buses. The system also automatically controls interconnect in the design, allowing for detailed verification of system-on-chip designs.

Gary Smith, chief EDA analyst at research firm Dataquest Inc., called the tool "a breakthrough technology" that goes beyond plug-and-play.

"It's in a completely new category," said Smith. "I'm trying to figure out a name for the category now, but the best I've come up with so far is behavioral interconnect compiler.

"The tool has the plug-and-play feature of a platform system, but it is much more. It automates the interconnect process. It slices and dices the verification process and makes it attackable."

James Fleury, senior vice president of sales and marketing at Sonics, said FastForward is targeted at simplifying and speeding the overall integration process. One way it does that is by eliminating the restrictions of microprocessor buses on the overall SoC process, Fleury said.

"SoC is largely CPU-centric," he said. "Typically, designers pick a CPU for their design and are stuck conforming the rest of their design to the CPU's particular bus standard or are stuck creating custom interfaces to connect subsystems. What that does is create a maze of wires in a design that is largely unmanageable."

Fleury said FastForward reduces SoC complexity, increases predictability and cuts SoC development time by 50 percent.

The system is chiefly composed of the SonicsIA (Integration Architecture) and Sonics Integration Tool Suite. SonicsIA has three main components: the SiliconBackplane, MultiChip Backplane and Open Core Protocol (OCP). Likewise, the Sonics Integration Tool Suite has three tools: CoreCreator, SOCIntegrator and SOC Builder.

Fleury said SonicsIA's SiliconBackplane provides the protocols and interconnect structure required to manage interblock interactions. He called the component a fully distributed multimaster and -slave, memory-mapped I/O, and processor-independent communication protocol for on-chip, point-to-point interconnect.

The SiliconBackplane merges computing's address-based selection, write and read transfers and pipelining with such communications capabilities as bandwidth decoupling, latency and sideband signaling. Fleury said the component makes the SoC integration process very

observable for validation, test and debugging. He said that all the blocks in the system communicate through the SiliconBackplane and that each block can be tested standalone or in full SoC context.

SonicsIA's MultiChip Backplane extends the SiliconBackplane protocol and provides chip-to-chip communications, allowing system partitioning and hardware prototyping with FPGAs and software development.

The third component of SonicsIA, OCP, is an open standard that defines a generic bus wrapper for cores. Sonics offered an early spec of OCP to the Virtual Socket Interface (VSI) alliance, which used the technology for the transaction protocol portion of its on-chip bus model.

According to Fleury, OCP is a synchronous read and write protocol with variable widths and flow control that connects blocks to the SiliconBackplane.

In the Sonics scheme, designers use CoreCreator to put an Open Core Protocol wrapper around blocks of custom logic or any core, hard or soft, so that it will talk to the SiliconBackplane. CoreCreator can also be used to produce a set of core representations, including instruction-set simulator and behavioral models, RTL, testbench, synthesis scripts and test vectors.

More cores

Designers would then use SOCIntegrator to add the "componentized" core and other "integration ready" cores to SiliconBackplane agents on the SiliconBackplane.

Next, designers would use SOCIntegrator to program the SiliconBackplane. Underlying the tool suite is a technology, called the SiliconBackplane Compiler, that Fleury said generates the connections between blocks based on user-programmable parameters. Designers specify bandwidth, latency, FIFO depth, address/data-bus width, control signals and more.

Designers could also perform functional simulation of blocks or whole designs at this stage. "Users simply specify which parts of the design they want simulated," said Fleury.

Designers would then feed cell libraries to SOCBuilder and use SOCBuilder to guide the SiliconBackplane and componentized cores through Synopsys Design Compiler synthesis. In conjunction with synthesis, SOCBuilder produces the SiliconBackplane in RTL Verilog. Fleury said an upcoming version of the tool will create a VHDL SiliconBackplane.

SOCBuilder also provides inputs for Synopsys' PrimeTime static timing analysis tool at the block and full-chip levels as well as pre- and post-layout. Further, it drives scan insertion for the SiliconBackplane and hooks up core test harnesses.

NEC Corp. is a beta customer of the system. Kojiro Watanabe, senior vice president and general manager of NEC USA, said the tool provided NEC with a direct path from system-level design to VLSI implementation. "Within six weeks, the entire system-chip's performance had been modeled and the SiliconBackplane configuration defined," he said.

In addition, Watanabe said, no changes were required to the system architecture during logical or physical design.

Doug Fairbairn, an industry veteran and management consultant who served a stint as VSI Alliance president and now is a member of Sonics' technical advisory board, said the company "is filling all the cracks between what everyone has been working on in this area. I think FastForward is a true leap ahead for SoC design and the closest thing to plug-and-play that we have seen in the industry."

Grant Pierce, president and chief executive officer of Sonics, said the company will employ a new business model to match the uniqueness of its offering. The company will draw upfront revenue from licensing the tool suite but will also draw per-part royalties for every silicon implementation of its backplane technology.

The fee for a single Sonics Integration Suite annual license is \$46,500 running on Sun Solaris, with pricing and longer-term options available.

CEO Pierce said the 24-person, venture-backed Sonics plans to add 15 employees by year's end and to make an initial public offering within two years.